IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (Previously Presented) A magnetoresistance effect element comprising:

a magnetoresistance effect film including a magnetization fixed layer having a ferromagnetic film in which the direction of magnetization is substantially fixed to one direction, a magnetization free layer having a ferromagnetic film in which the direction of magnetization varies in response to an external magnetic field, and a non-magnetic intermediate layer provided between the magnetization fixed layer and the magnetization free layer, the non-magnetic intermediate layer comprising a non-magnetic metallic layer and a resistance regulating layer stacked on the non-magnetic metallic layer, the resistance regulating layer formed in the non-magnetic intermediate layer or on the interface between the non-magnetic intermediate layer and at least one of the magnetization fixed layer and the magnetization free layer; and

a pair of electrodes which are electrically connected to the magnetoresistance effect film for applying a current in a direction perpendicular to the plane of the magnetoresistance effect film,

the resistance regulating layer containing an oxide, a nitride, a fluoride, a carbide or a boride as a principal component and including holes of a metal phase of 2% to 30%, and

the mean diameter of each of the holes of the resistance regulating layer being in the range from 10% to 100% with respect to the total thickness of the magnetization free layer, the non-magnetic intermediate layer and the magnetization fixed layer.

2. (Previously Presented) A magnetoresistance effect element as set forth in claim 1, wherein the resistance regulating layer restricts the quantity of a sense current passing through the magnetoresistance effect film.

3. (Currently Amended) A magnetoresistance effect element as set forth in claim 1, wherein the resistance regulating layer has [[pin]] the holes at a rate of hole area which is 50 % or less.

4. (Original) A magnetoresistance effect element as set forth in claim 1, wherein the resistance regulating layer is made of two kinds or more of metallic elements.

5. (Withdrawn) A magnetoresistance effect element as set forth in claim 1, wherein the resistance regulating layer is formed in the magnetization free layer, or on the magnetization free layer on the opposite side to the non-magnetic intermediate layer.

6. (Canceled)

7. (Withdrawn) A magnetoresistance effect element as set forth in claim 1, wherein the resistance regulating layer is formed in the magnetization fixed layer, or on the magnetization fixed layer on the opposite side to the non-magnetic intermediate layer.

8. (Previously Presented) A magneto resistance effect element as set forth in claim 1, wherein the resistance regulating layer contains, as a principal component, at least one of oxides, nitrides, fluorides, carbides or borides of an element selected from the group

consisting of B, Si, Ge, Ta, W, Nb, Al, Mo, P, V, As, Sb, Zr, Ti, Zn, Pb, Th, Be, Cd, Sc, La, Y, Pr, Cr, Sn, Ga, Cu, In, Rh, Pd, Mg, Li, Ba, Ca, Sr, Mn, Fe, Co, Ni and Rb.

9. (Withdrawn) A magnetoresistance effect element as set forth in claim 1, wherein the resistance regulating layer is formed on the magnetization free layer on the opposite side to the non-magnetic intermediate layer, or in the non-magnetic intermediate layer, or on the interface of the non-magnetic intermediate layer, and contains a metal including at least one of Cu, Au, Ag, Ru, Ir, Re, Rh, Pt, Pd, Al and Os.

10. (Withdrawn) A magnetoresistance effect element as set forth in claim 1, wherein the resistance regulating layer comprises:

a first region which is formed on the magnetization free layer on the opposite side to the non-magnetic intermediate layer, or in the non-magnetic intermediate layer, or on the interface of the non-magnetic intermediate layer, and which contains Cu as a principal component; and

a second region which contains, as a principal component, at least one of oxides, nitrides, fluorides, carbides and borides of an element selected from the group consisting of B, Fe, Mo, Pb, Ta, Cr, V, Si, Sb and Ge.

11. (Withdrawn) A magnetoresistance effect element as set forth in claim 6, wherein the resistance regulating layer comprises:

a first region which is formed on the magnetization free layer on the opposite side to the non-magnetic intermediate layer, or in the non-magnetic intermediate layer, or on the interface of the non-magnetic intermediate layer, and which contains Au as a principal component; and

a second region which contains, as a principal component, at least one of oxides, nitrides, fluorides, carbides and borides of an element selected from the group consisting of B, Fe, Ge, Mo, P, Rh, Si, W and Cr.

12. (Withdrawn) A magnetoresistance effect element as set forth in claim 1, wherein the resistance regulating layer comprises:

a first region which is formed on the magnetization free layer on the opposite side to the non-magnetic intermediate layer, or in the non-magnetic intermediate layer, or on the interface of the non-magnetic intermediate layer, and which contains Ag as a principal component; and

a second region which contains, as a principal component, at least one of oxides, nitrides, fluorides, carbides and borides of an element selected from the group consisting of Be, Co, Cr, Fe, Mo, Pb, Si, Ta, V, W, Ge, Sn, Al and Rh.

13. (Withdrawn) A magnetoresistance effect element comprising:

a magnetoresistance effect film including a magnetization fixed layer having a ferromagnetic film in which the direction of magnetization is substantially fixed to one direction, a magnetization free layer having a ferromagnetic film in which the direction of magnetization varies in response to an external magnetic field, and an non-magnetic intermediate layer provided between the magnetization fixed layer and the magnetization free layer;

a pair of electrodes which are electrically connected to the magnetoresistance effect film for applying a current in a direction perpendicular to the plane of the magnetoresistance effect film; and

a region which is formed on the magnetization free layer on the opposite side to the non-magnetic intermediate layer, or in the non-magnetic intermediate layer, or on the interface of the non-magnetic intermediate layer, and which contains, as a principal component, a crystalline oxide containing at least one selected from the group consisting of B, Si, Ge, W, Nb, Mo, P, V, Sb, Zr, Ti, Zn, Pb, Cr, Sn, Ga, Fe and Co.

14. (Withdrawn) A magnetoresistance effect element as set forth in claim 1, wherein the resistance regulating layer has a thickness of 0.5 to 5 nm.

15. (Withdrawn) A magnetoresistance effect element as set forth in claim 1, wherein the resistance regulating layer includes holes of a metal phase of 2 % to 30 %.

16. (Withdrawn) A magnetoresistance effect element as set forth in claim 15, wherein the mean diameter of each of the holes of the resistance regulating layer is in the range of from 5 % to 100 % with respect to the total thickness of the magnetization free layer, the non-magnetic intermediate layer and the magnetization fixed layer.

17. (Withdrawn) A magnetoresistance effect element as set forth in claim 15, wherein the distance between adjacent two of the holes of the metal phase is in the range of from 10 nm to 100 nm.

18. (Withdrawn) A magnetoresistance effect element as set forth in claim 15, wherein the mean distance between adjacent two of the holes of the metal phase is in the range of from 10 nm to 100 nm.

19. (Previously Presented) A magnetic head having a magnetoresistance effect element as set forth in any one of claims 1-5 and 7-17.

20. (Original) A magnetic recording and/or reproducing system which has a magnetic head as set forth in claim 19 and which is capable of reading magnetic information stored in a magnetic recording medium.

21. (Previously Presented) A magnetoresistance effect element as set forth in claim 1, wherein the resistance regulating layer is formed in the non-magnetic intermediate layer, and contains a metal including at least one of Cu, Au, Ag, Ru, Ir, Re, Rh, Pt, Pd, Al and Os.

22. (Previously Presented) A magnetoresistance effect element as set forth in claim 1, wherein the resistance regulating layer is formed of an insulating material which has pin holes, and an electric conduction of the resistance regulating layer is regulated by the pin holes.

23. (Previously Presented) A magnetoresistance effect element as set forth in claim 2, wherein the resistance regulating layer contains, as a principal component at least one of oxides, nitrides, fluorides, carbides or borides of an element selected from the group consisting of B, Si, Ge, Ta, W, Nb, Al, Mo, P, V, As, Sb, Zr, Ti, Zn, Pb, Th, Be, Cd, Sc, La, Y, Pr, Cr, Sn, Ga, Cu, In, Rh, Pd, Mg, Li, Ba, Ca, Sr, Mn, Fe, Co, Ni and Rb.

24. (Canceled)

25. (Canceled)

26. (Previously Presented) A magnetoresistance effect element as set forth in claim 1, wherein the resistance regulating layer includes pin holes in the oxide, the nitride, the fluoride, the carbide, or the boride, the pin holes containing an element of the same kind in the oxide, the nitride, the fluoride, the carbide, or the boride.

27. (Currently Amended) A magnetoresistance effect element as set forth in claim 1, wherein the resistance regulating layer includes [[pin]] the holes in the oxide, the nitride, the fluoride, the carbide, or the boride, the [[pin]] holes containing an element of different kind of the oxide, the nitride, the fluoride, the carbide, or the boride.

28. (Currently Amended) A magnetoresistance effect element as set forth in claim 2, wherein the resistance regulating layer includes [[pin]] the holes in the oxide, the nitride, the fluoride, the carbide, or the boride, the [[pin]] holes containing an element of the same kind in the oxide, the nitride, the fluoride, the carbide, or the boride.

29. (Currently Amended) A magnetoresistance effect element as set forth in claim 2, wherein the resistance regulating layer includes [[pin]] the holes in the oxide, the nitride, the fluoride, the carbide, or the boride, the [[pin]] holes containing an element of different kind in the oxide, the nitride, the fluoride, the carbide, or the boride.

30. (Currently Amended) A magnetoresistance effect element as set forth in claim 1, wherein the resistance regulating layer comprises [[pin]] the holes in the oxide, the nitride, the fluoride, the carbide, or the boride, and

two adjacent layers contacting the resistance regulating layer have an electric conduction through the [[pin]] holes of the resistance regulating layer.

31. (Currently Amended) A magnetoresistance effect element as set forth in claim 2, wherein the resistance regulating layer comprises [[pin]] the holes in the oxide, the nitride, the fluoride, the carbide, or the boride, and

two adjacent layers contacting the resistance regulating layer have an electric conduction through the [[pin]] holes of the resistance regulating layer.

32. (Previously Presented) A magnetoresistance effect element comprising:

a magnetoresistance effect film including a magnetization fixed layer having a ferromagnetic film in which the direction of magnetization is substantially fixed to one direction, a magnetization free layer having a ferromagnetic film in which the direction of magnetization varies in response to an external magnetic field, and an non-magnetic intermediate layer provided between the magnetization fixed layer and the magnetization free layer, the non-magnetic intermediate layer comprising a non-magnetic metallic layer and a resistance regulating layer stacked on the non-magnetic metallic layer, the resistance regulating layer formed in the non-magnetic intermediate layer or on the interface between the non-magnetic intermediate layer and at least one layer of the magnetization fixed layer and the magnetization free layer, and

a pair of electrodes which are electrically connected to the magnetoresistance effect film for applying a current in a direction perpendicular to the plane of the magnetoresistance effect film,

the resistance regulating layer containing an oxide, a nitride, a fluoride, a carbide or a boride as a principal component and including holes, and

the magnetoresistance effect element sensing a relative angle between the magnetization direction of the magnetization fixed layer and the magnetization direction of the magnetization free layer by a change of current passing through the holes.

33. (Previously Presented) A magnetoresistance effect element comprising;

a magnetoresistance effect film including a magnetization fixed layer having a ferromagnetic film in which the direction of magnetization is substantially fixed to one direction, a magnetization free layer having a ferromagnetic film in which the direction of magnetization varies in response to an external magnetic field, and a non-magnetic intermediate layer provided between the magnetization fixed layer and the magnetization free layer, the non-magnetic intermediate layer comprising a non-magnetic metallic layer and a resistance relating layer stacked on the non-magnetic metallic layer, the resistance regulating layer formed in the non-magnetic intermediate layer or on the interface between the non-magnetic intermediate layer and at least one of the magnetization fixed layer and the magnetization free layer; and

a pair of electrodes which are electrically connected to the magnetoresistance effect film for applying a current in a direction perpendicular to the plane of the magnetoresistance effect film,

the resistance regulating layer containing an oxide, a nitride, a fluoride, a carbide or a boride as a principal component and having a pin holes at a rate of hole area which is 50% or less, and

two adjacent layers which contact the resistance regulating layer having an electric conduction substantially limited to conduction through the pin holes of the resistance regulating layer.

34. (Previously Presented) A magnetoresistance effect element as set forth in claim 33, wherein the resistance regulating layer is made of two kinds or more of metallic elements.

35. (Previously Presented) A magnetoresistance effect element as set forth in claim 33, wherein the resistance regulating layer contains, as a principal component, at least one of oxides, nitrides, fluorides, carbides or borides of an element selected from the group consisting of B, Si, Ge, Ta, W, Nb, Al, Mo, P, V, As, Sb, Zr, Ti, Zn, Pb, Th, Be, Cd, Sc, La, Y, Pr, Cr, Sn, Ga, Cu, In, Rh, Pd, Mg, Li, Ba, Ca, Sr, Mn, Fe, Co, Mi and Rb.

36. (Previously Presented) A magnetoresistance effect element as set forth in claim 33, wherein the resistance regulating layer is formed of an insulating material which has pin holes.

37. (Previously Presented) A magnetoresistance effect element as set forth in claim 33, wherein the pin holes are provided with metal therein.

38. (Previously Presented)A magnetoresistance effect element as set forth in claim 33, wherein the resistance regulating layer is formed of a first material which is relatively easy to be oxidized and a second material which is difficult to be oxidized, and pin holes are formed of the second material.

39. (Previously Presented) A magnetoresistance effect element comprising:

a magnetoresistance effect film including a magnetization fixed layer having a ferromagnetic film in which the direction of magnetization is substantially fixed to one direction, a magnetization free layer having a ferromagnetic film in which the direction of

magnetization varies in response to an external magnetic field, and a non-magnetic intermediate layer provided between the magnetization fixed layer and the magnetization free layer, the non-magnetic intermediate layer comprising a non-magnetic metallic layer and a resistance regulating layer stacked on the non-magnetic metallic layer, the resistance regulating layer formed in the non-magnetic intermediate layer or on the interface between the non-magnetic intermediate layer and at least one of the magnetization fixed layer and the magnetization free layer; and

a pair of electrodes which are electrically connected to the magnetoresistance effect film for applying a current in a direction perpendicular to the plane of the magnetoresistance effect film,

the resistance regulating layer containing an oxide, a nitride, a fluoride, a carbide or a boride as a principal component and having a pin holes at a rate of hole area which is 50% or less, and

at least 10 pin holes being formed in the resistance regulating layer.

40. (Previously Presented) A magnetoresistance effect element as set forth in claim 39, wherein the resistance regulating layer is made of two finds or more of metallic elements.

41. (Previously Presented) A magnetoresistance effect element as set forth in claim 39, wherein the resistance regulating layer contains, as a principal component, at least one of oxides, nitrides, fluorides, carbides or borides of an element selected from the group consisting of B, Si, Ge, Ta, W, Nb, Al, Mo, P, V, As, Sb Zr, Ti, Zn, Pb, Th, Be, Cd, Sc, La, Y, Pr, Cr, Sn, Ga, Cu, In, Rh, Pd, Mg, Li, Ba, Ca, Sr, Mn, Fe, Co, Ni and Rb,

42. (Previously Presented) A magnetoresistance effect element as set forth in claim 39, wherein the resistance regulating layer is formed of an insulating material which has pin holes.

43. (Previously Presented) A magnetoresistance effect element as set forth in claim 39, wherein the pin holes are provided with metal therein.

44. (Previously Presented) A magnetoresistance effect element as set forth in claim 39, wherein the resistance regulating layer is formed of a first material which is relatively easy to be oxidized and a second material which is difficult to be oxidized, wherein pin holes are formed of the second material.